



Re-Accredited 'B++' 2.86 CGPA by NAAC

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

સંદર્ભ: યુનિવર્સિટી કાર્યાલયના તા.૨૭-૦૬-૨૦૨૩, ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૧૬૨૧૭/૨૦૨૩

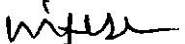
-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર શિક્ષણ વિભાગના રાજ્યની તમામ ઉચ્ચ શૈક્ષણિક સંસ્થાઓ માટે રાષ્ટ્રીય શિક્ષણ નીતિ ૨૦૨૦ અંતર્ગત કોમન કરીક્યુલમ એન્ડ ક્રેડિટ ફ્રેમવર્ક હેઠળ ક્રેડિટ માળખું અમલીકરણ માટે નિયત કરવા બાબત અંગેના તા.૧૧/૦૭/૨૦૨૩, ઠરાવ ક્રમાંક: KCG/admin/2023-24/0607 /kh.1 અનુસાર તથા વિજ્ઞાન વિદ્યાશાખાનાં સ્ટ્રક્ચર મુજબ શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર B.Sc. Physics Sem-1 & 2 નો Major Course નો અભ્યાસક્રમ ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા. ૨૪/૦૭/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે કરેલ ભલામણ તથા ચેરમેનશ્રીએ Minor, MDC, SEC કોર્સના અભ્યાસક્રમ અભ્યાસ સમિતિ વતી કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની મંજૂરી ની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા. ૧૭/૦૮/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક:૦૮ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

- ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિની ૨૪/૦૭/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક: ૨**
- :: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર B.Sc. Physics Sem-1 & 2 નો Major Course નો અભ્યાસક્રમ મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.
- એકેડેમિક કાઉન્સિલની તા. ૧૭/૦૮/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક:૦૮**
- :: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર B.Sc. Physics Sem-1 & 2 નો Major કોર્સનો અભ્યાસક્રમ ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા. ૨૪/૦૭/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે કરેલ ભલામણ તથા ચેરમેનશ્રીએ Minor, MDC, SEC કોર્સના અભ્યાસક્રમ અભ્યાસ સમિતિવતી કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૨૧૫૪૮/૨૦૨૩
તા. ૧૮-૦૮-૨૦૨૩


કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારું.
- ૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારું.

Veer Narmad South Gujarat University, Surat

Syllabus as per NEP-2020

B.Sc. Semester: I & 2 (PHYSICS)

- **Physics Major (Discipline Specific Core-DSC)**
- **Physics Minor (Generic Elective-GE)**
- **Multidisciplinary Courses (MDC)**
- **Skill Enhancement courses (SEC)**

(Effective from the Academic Year 2023-24)

B.Sc. Semester I (Physics Major)

B.Sc. Semester-I

Course code: PH-MJ 101

Total Credits: 04 (Theory: 3, Practical; 1)

Total Hrs: Theory: 45, Practical: 30

PH-MJ 101 (Theory)

Unit1	Vector Analysis (Vector Analysis by Murray Spiegel, Schaum's Outline, 2nd Ed. McGraw-Hill, 2009)
	Dot or scalar product, Cross or vector product, Triple product, reciprocal sets of vectors (Ch. 2), Ordinary derivatives of vectors, space curves, continuity and differentiability, differentiation formulae, Partial derivatives of vectors, differentials of vectors, differential geometry (Ch. 3), The vector differential operator del, the gradient, the divergence and the curl, formulae involving del, invariance (Ch. 4) Ordinary integrals of vectors, line integrals, surface integrals and volume integrals (Ch. 5), The divergence theorem of Gauss, Stokes' theorem, Green's theorem in the plane (statements only)
Unit2	Force, Newton's laws and Momentum (Physics by Halliday, Resnick and Krane, Vol.1, 5th Ed. Wiley)
	Classical Mechanics (3.1), Newton's first law (3.2), Force (3.3), Mass (3.4), Newton's second law (3.5), Newton's third law (3.6), Weight and mass (3.7), Applications of Newton's laws in one dimension (3.8) Motion in three dimensions with constant acceleration (4.1), Newton's laws in three dimensional vector form (4.2), Projectile motion (4.3), Drag forces and the motion of projectile (4.4), Uniform circular motion (4.5), Relative motion (4.6) Collisions (6.1), Linear momentum (6.2), Impulse and momentum (6.3), Conservation of momentum (6.4), Two-body collisions (6.5)
Unit3	Systems of particles (Physics by Halliday, Resnick and Krane, Vol. 1, 5th Ed. Wiley) & Elasticity I (Properties of Matter by D. S. Mathur, S. Chand & Co., 2009)
	Systems of particles: Two particle systems (7.2), many particle systems (7.3), centre of mass of solid objects (7.4), conservation of momentum in a system of particles (7.5), system of variable mass (7.6) Elasticity: Introduction (8.1), Load, stress and strain (8.2), Hooke's law (8.3), ductility, brittleness and plasticity (8.4), elastic behavior of solids in general (8.5), factors affecting elasticity (8.7), three types of elasticity (8.8), equivalence of a shear to a compression and an extension at right angles to each other (8.9), deformation of a cube – bulk modulus (8.12), modulus of rigidity (8.13), Young's modulus (8.14), relations connecting the elastic constant (8.15), Poisson's ratio (8.16), relations for K and η in terms of Poisson's ratio (8.17), limiting values of σ (8.18)

ReferenceBooks:

1. Mathematical Methods for Physics and Engineering by Riley, Hobson and Bence, Cambridge University Press, 1998.
2. Mechanics (Berkeley Physics Course 1 by C Kittle, W D Knight, M. Alvine and A. Ruderman, Tata McGraw-Hill, 1991.
3. University Physics by Young and R. Freedman, Pearson 13th Ed., 2013.

B.Sc. Semester-I
Practical: PH-MJ 101 (P)

Sr.No.	Experiment
1	To do error analysis and least square fitting
2	To determine force constant (k) of a spring
3	To study one-dimensional elastic collision using two hanging balls
4	To determine modulus of rigidity of a rod by Searle's apparatus
5	To determine Poisson's ratio of rubber
6	Study of Melde's experiment (with constant mass)
7	Study of Melde's experiment (with constant length)
8	Demonstration of cathetometer

Reference Books

1. D. C. Tayal, University Practical physics, Edited by Ila Agarwal, Himalayan Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Geeta Sanon, B.Sc. Practical Physics, 1st Ed. (2007), R. Chand & Co.

Note:

1. The duration of each experiment is of 2 hours. Two such experiments are to be performed by each student per week..
2. In the external exam, a student will have to perform two experiments, one from each group. The experiment will be of 2 hour duration.
3. There should be two examiners, one for each group, in the external examination.
4. There should not be more than **10 students** per examiner per session in the external examination.

B.Sc. Semester-I
Course code: PH-MJ 102

Total Credits: 04 (Theory: 3, Practical; 1)

Total Hrs: Theory: 45, Practical: 30

PH-MJ 102 (Theory)

Unit1	Electrostatics I (Physics by Halliday, Resnik and Krane, Vol.2, 5th edition, Wiley)
	Coulomb's law (25.4), what is a field? (26.1), the electric field (26.2), electric field of point charges (26.3), electric field of continuous charge distributions (26.4), electric field lines (26.5), a point charge in an electric field (26.6) What is Gauss' law all about? (27.1), the flux of a vector field (27.2), the flux of the electric field (27.3), Gauss' law (27.4), applications of Gauss' law (27.5), Gauss' law and conductors (27.6) Potential energy (28.1), electric potential energy (28.2), electric potential (28.3), calculating the potential from the field (28.4), potential due to point charges (28.5), calculating the field from the potential (28.7), equi-potential surfaces (28.8), Electric current (31.1), electro motive force (31.2), analysis of circuits (31.3), RC circuits (31.7)
Unit2	Diode circuits, Special purpose diodes and Bipolar Junction Transistors (Electronic principles by A. P. Malvino, 6th Ed., Tata Mc Graw-Hill Ltd.)
	Diode circuits: The half-wave rectifier (4.1), the transformer (4.2), the full-wave rectifier (4.3), the bridge rectifier (4.4), the choke input filter (4.5), the capacitor input filter (4.6), clippers and limiters (4.10), clampers (4.11) Special purpose diodes: The zener diode (5.1), the loaded zener regulator (5.2) Bipolar Junction Transistors: The unbiased transistor (6.1), the biased transistor (6.2), transistor currents (6.3), the CE connection (6.4), the base curve (6.5), collector curves (6.6)
Unit3	Optics (Optics by Ajoy Ghatak, 6th edition, McGraw-Hill Education)
	Introduction (3.1), laws of reflection and refraction from Fermat's principle (3.2), introduction (4.1), refraction at a single spherical surface (4.2), reflection by a single spherical surface (4.3), the thin lens (4.4), the principle foci and the focal length of a lens (4.5), the Newton's formula (4.6), lateral magnification (4.7), aplanatic points of a sphere (4.8)

Reference Books:

1. Elements of Electromagnetics by MNO Sadiku, Oxford University Press, 2001
2. Electricity and Magnetism by A S Mahajan and A R Rangwala 7th Ed. Tata McGraw-Hill, 2003.
3. University Physics by H D Young, R A Freedman and A Lewis Ford, 13th Ed. Pearson Education, 2013
4. Fundamentals of Optics by F Jenkins and H White 4th Ed. McGraw Hill Education

B.Sc. Semester-I

Practical: PH-MJ 102 (P)

Sr.No.	Experiment
1	To determine low resistance using Wheatstone's bridge by the method of Projection of potential
2	To study decay of current in an RC circuit
3	To study half wave rectifier with various filters
4	To study full wave rectifier with various filters
5	To determine resistivity of the material of a conductor using Ohm's law
6	To determine cardinal points of a lens system placed in air
7	To determine angle of prism using spectrometer
8	Demonstration of spectrometer

ReferenceBooks

5. D. C. Tayal, University Practical physics, Edited by Ila Agarwal, Himalayan Publishing House
6. B. L. Worsnop and H.T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
7. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
8. Geeta Sanon, B.Sc. Practical Physics, 1st Ed. (2007), R. Chand & Co.

Note:

1. The duration of each experiment is of 2 hours. Two such experiments are to be performed by each student per week..
2. In the external exam, a student will have to perform two experiments, one from each group. The experiment will be of 2 hour duration.
3. There should be two examiners, one for each group, in the external examination.
4. There should not be more than **10 students** per examiner per session in the external examination

B.Sc. Semester-II (Physics Major)

B.Sc. Semester-II

Course code: PH-MJ 201

Total Credits: 04 (Theory: 3, Practical; 1)

Total Hrs: Theory: 45, Practical: 30

PH-MJ 201 (Theory)

Unit1	Rotational Motion (Physics by Halliday, Resnik and Krane, Vol.1, 5th edition, Wiley)
	Rotational motion(8.1), The rotational variables(8.2), Rotational quantities as vectors (8.3), rotation with constant angular acceleration (8.4), relationships between linear and angular variables (8.6) Torques(9.1), rotational inertia and Newton's second law (9.2), rotational inertia of solid bodies(9.3), torque due to gravity (9.4), equilibrium applications of Newton's laws for rotation (9.5) Angular momentum of a particle(10.1), systems of particles (10.2), angular Momentum and angular velocity(10.3), conservation of angular momentum (10.4)
Unit2	Oscillations and Waves (Oscillations and Waves by Suresh Garg, C.K. Ghosh And anjay Gupta Prentice Hall of India, 2009)
	Introduction (3.1), principle of superposition and linearity (3.2), superposition of two collinear SHO of same frequency(3.3), superposition of two collinear SHOs of nearly equal frequencies (3.4), superposition of two mutually perpendicular harmonic oscillations (3.6), describing wave motion (7.3), phase of a wave (7.4), Energy transported by a progressive wave(7.5), intensity of a wave (7.6)
Unit3	Elasticity II (Properties of Matter by D. S. Mathur, S. Chand & Co., 2009) & Gravitation (Physics by Halliday, Resnik and Krane, Vol.1, 5th edition, Wiley)
	Elasticity: Twisting couple on a cylinder (8.22), torsional pendulum (8.26), determination of coefficient of rigidity (n) for a wire (8.27), bending of a beam (8.39), the cantilever(8.30), transverse vibrations of a loaded cantilever (8.32), depression of a beam supported at the ends (8.33), determination of Y by bending of beams (8.34), Determination of elastic constants by Searle's method (8.36) Gravitation: Origin of the law of gravitation(14.1), Newton's law of universal gravitation(14.2), the gravitational constant G (14.3), gravitation near the earth's surface (14.4), the two shell theorems (14.5), gravitational potential energy(14.6)

Reference Books:

1. Mechanics (Berkeley Physics Course 1 by C Kittle, W D Knight, M Alvine and A Ruderman, Tata McGraw-Hill, 1991.
2. Modern Physics by Kenneth S Krane, Wiley India Edition, 2016
3. Vibrations and Waves by AP French, CBS: 1st Ed. 2003

B.Sc. Semester-II
Practical: PH-MJ 201 (P)

Sr.No.	GroupA
1	To verify the perpendicular axes theorem of moment of inertia
2	To verify the parallel axes theorem of moment of inertia
3	To determine elastic constants, Y , λ , K and μ , by Searle's method
4	To determine "Y" by cantilever
5	To determine "Y" by the method of bending
6	To determine modulus of rigidity of a wire using torsional pendulum
7	To determine thermal conductivity of a bad conductor by Lee's method
8	Demonstration of travelling microscope

ReferenceBooks

1. D. C. Tayal, University Practical physics, Edited by Ila Agarwal, Himalayan Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Geeta Sanon, B.Sc. Practical Physics, 1st Ed. (2007), R. Chand & Co.

Note:

1. The duration of each experiment is of 2 hours. Two such experiments are to be performed by each student per week..
2. In the external exam, a student will have to perform two experiments, one from each group. The experiment will be of 2 hour duration.
3. There should be two examiners, one for each group, in the external examination.
4. There should not be more than **10 students** per examiner per session in the external examination.

B.Sc. Semester-II
Course code: PH-MJ 202

Total Credits: 04 (Theory: 3, Practical; 1)

Total Hrs: Theory: 45, Practical: 30

PH-MJ 202 (Theory)

Unit1	Magneto-statics and Electro magnetic Induction (Physics by Halliday, Resnik and Krane, Vol.2, 5th edition, Wiley)
	Magneto-statics: Magnetic interactions and magnetic poles (32.1), the magnetic force on a moving charge (32.2), circulating charges (32.3), the magnetic force on a current carrying wires (32.5), the torque on a current loop (32.6) Electromagnetic Induction: Faraday's experiments (34.1), Faraday's law of induction (34.2), Lenz's law (34.3), motional emf (34.4), generator and motor (34.5)
Unit2	Thermodynamics (Physics by Halliday, Resnik and Krane, Vol.2, 5th edition)
	Temperature and thermal equilibrium (21.1), thermal expansion (21.4), the ideal gas (21.5), a molecular view of pressure (22.2), the mean free path (22.3), the distribution of molecular speeds (22.4), equations of state for real gas (22.6) Heat: energy and transit (23.1), the transfer of heat (23.2), the first law of thermodynamics (23.8), the application of the first law of thermodynamics (23.8) Defining entropy change (24.2), entropy change for irreversible process (24.3), the Second law of thermodynamics (24.4)
Unit3	Optics (Optics by Ajoy Ghatak, 6th edition, McGraw-Hill Education) and Particle properties of waves (Concepts of Modern Physics by A. Beiser)
	Optics: Introduction (12.1), Huygens' theory (12.2), Introduction (13.1), superposition of two sinusoidal waves (13.5), Introduction (14.1), coherence (14.3), interference of light waves (14.4), the interference pattern (14.5), the intensity distribution (14.6) Particle properties of waves: Blackbody radiation (2.2), photoelectric effect (2.3), what is light (2.4), X-rays (2.5), X-ray diffraction (2.6), Compton effect (2.7), pair production (2.8), photons and gravity (2.9)

Reference Books:

1. Electricity and Magnetism by A S Mahajan and A R Rangwala 7th Ed. Tata McGraw-Hill, 2003.
2. University Physics by H D Young, R A Freedman and A Lewis Ford, 13th Ed. Pearson Education, 2013.
3. Fundamentals of Optics by F Jenkins and H White, 4th Ed. McGraw Hill Education,

B.Sc. Semester-II

Practical: PH-MJ 202 (P)

Sr.No.	Experiment
1	To study magnetic field due to a current carrying solenoid
2	To study wattage of a lamp
3	To determine the refractive index of the material of prism using spectrometer
4	To determine wavelength of monochromatic light using Newton's rings
5	To study characteristics of a BJT (CE configuration)
6	To study zener diode as a voltage regulator
7	To determine radius of curvature of the curved surface of the plano-convex lens using Newton's rings
8	To determine characteristics of photocell

Reference Books

1. D. C. Tayal, University Practical physics, Edited by Ila Agarwal, Himalaya Publishing House.
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Geeta Sanon, BSc Practical Physics, 1st Ed. (2007), R. Chand & Co.

Note:

1. The duration of each experiment is of 2 hours. Two such experiments are to be performed by each student per week..
2. In the external exam, a student will have to perform two experiments, one from each group. The experiment will be of 2 hour duration.
3. There should be two examiners, one for each group, in the external examination.
4. There should not be more than **10 students** per examiner per session in the external examination.

B.Sc. Semester-I (Physics Minor) (Generic Elective –GE)

B.Sc. Semester-I

Course code: PH-MN 101

Total Credits: 04 (Theory: 2, Practical; 2)

Total Hrs: Theory: 30, Practical: 60

PH-MN 201 (Theory)

Unit 1	Waves and Oscillations: (Waves and Oscillation By N Subrahmanyam and BrijLal)
	Wave Motion(4.1), What propagates in wave (4.2), Characteristics of wave motion(4.3), Transverse wave motion (4.4),Relation between frequency and wavelength (4.7), Equation of simple harmonic wave (4.11),Differential equation of wave motion (4.12) particle velocity and phase velocity(4.13), Energy of progressive wave(4.15),Laws of transverse vibration of string (7.3), Melde’s experiment(7.5)
Unit 2	Elasticity (Properties of Matter by D. S. Mathur, S. Chand & Co., 2009)
	Introduction (8.1), Load, stress and strain (8.2), Hooke’s law (8.3), ductility, brittleness and plasticity (8.4), elastic behaviour of solids in general (8.5), factors affecting elasticity (8.7), three types of elasticity (8.8), equivalence of a shear to a compression and an extension at right angles to each other (8.9), deformation of a cube – bulk modulus (8.12), modulus of rigidity (8.13), Young’s modulus (8.14), relations connecting the elastic constant (8.15), Poisson’s ratio (8.16), relations for K and n in terms of Poisson’s ratio (8.17), limiting values of σ (8.18)

ReferenceBooks:

1. Mechanics (Berkley Physics Course 1 by C Kittle, W D Knight, M.Alvine and A.Ruderman,Tata McGraw-Hill, 1991.
2. University Physics byYoungand R.Freedman,Pearson 13thEd., 2013.

B.Sc. Semester-I
Practical: PH-MN 101 (P)

Sr. No.	Experiment
1	To do error Analysis
2	To determine the modulus of rigidity of wire using torsional pendulum
3	To determine the modulus of rigidity of rod by Searle's apparatus
4	To determine elastic constant Y by Searl's method
5	To determine elastic constant η by Searl's method
6	To determine force Constant (k) of a spring
7	Study of Melde's experiment (with constant mass)
8	Study of Melde's experiment (with constant length)
9	Study of Resonance phenomena using tuning frock
10	Calculate AC frequency using Sonometer
11	Study of damped oscillation
12	Modulus of rigidity of material of flat spiral spring

ReferenceBooks

1. D.C.Tayal, University Practical physics, Edited by IlaAgarwal,Himalayan Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. GeetaSanon, BSc Practical Physics, 1st Ed. (2007), R. Chand & Co.

B.Sc. Semester-II
Course code: PH-MN 201

Total Credits: 04 (Theory: 2, Practical; 2)

Total Hrs: Theory: 30, Practical: 60

Unit 1	Electrostatics (Physics by Halliday, Resnik and Krane, Vol. 2, 5th edition, Wiley)
	Coulomb's law (25.4), what is a field? (26.1), the electric field (26.2), electric field of point charges (26.3), electric field lines (26.5), What is Gauss' law all about? (27.1), the flux of a vector field (27.2), the flux of the electric field (27.3), Gauss' law (27.4), applications of Gauss' law (27.5), Potential energy (28.1), electric potential energy (28.2), electric potential (28.3), calculating the potential from the field (28.4), potential due to point charges (28.5), calculating the field from the potential (28.7), equi-potential surfaces (28.8)
Unit 2	Electronics & Optics (Electronic principles by A. P. Malvino, 6th Ed., Tata Mc Graw-Hill Ltd.)
	Electronics :The half-wave rectifier (4.1), the transformer (4.2), the full-wave rectifier (4.3), the bridge rectifier (4.4), the choke input filter (4.5), the capacitor input filter (4.6) The zener diode (5.1), the loaded zener regulator (5.2) Optics : Introduction (3.1), laws of reflection and refraction from Fermat's principle (3.2), introduction (4.1), refraction at a single spherical surface (4.2), reflection by a single spherical surface (4.3), the thin lens (4.4), the principle foci and the focal length of a lens (4.5), the Newton's formula (4.6), lateral magnification (4.7), aplanatic points of a sphere (4.8)

Reference Books:

1. Elements of Electromagnetic by MNO Sadiku, Oxford University Press, 2001
2. Electricity and Magnetism by A S Mahajan and A R Rangwala 7th Ed. Tata McGraw-Hill, 2003.
3. University Physics by H D Young, R A Freedman and A Lewis Ford, 13th Ed. Pearson Education, 2013
4. Fundamentals of Optics by F Jenkins and H White 4th Ed. McGraw Hill Education

B.Sc. Semester-II
Practical: PH-MN 201 (P)

Sr. No.	Experiment
1	To study decay of current in an RC circuit
2	To study half wave rectifier with various filters
3	To study full wave rectifier with various filters
4	To determine resistivity of the material of a conductor using Ohm's law
5	To study wattage of lamp
6	To study magnetic field intensity using solenoid
7	To convert galvanometer into Ammeter and Voltmeter.
8	To study zenor diode as a voltage regulator
9	To determine refractive index of liquid using lens
10	To Determine focal length of lens using lens formula
11	To determine Cardinal points of lens system
12	To determine dispersive power of prism

Reference Books

1. D.C.Tayal, University Practical physics, Edited by Ila Agarwal, Himalayan Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Geeta Sanon, BSc Practical Physics, 1st Ed. (2007), R. Chand & Co.

Physics Multidisciplinary Courses (PH-MDC)

B.Sc. Semester-I

Course code: PH-MDC-1

Total Credits: 04 (Theory: 2, Practical; 2)

Total Hrs: Theory: 30, Practical: 60

Course Title: Mathematical Physics

PH-MDC-1 (Theory)

Unit-1	Introduction: What Is Physics? , Physics and Mathematics, Units, Definitions of Base Units, Dimension, Uses of Dimension, Order of Magnitude, Examples Vectors and Scalars: Definition Equality of Vectors, Addition of Vectors, Multiplication of a Vector by a Number, Subtraction of Vectors, Resolution of Vectors, Dot Product or Scalar Product of Two Vectors ,Cross Product or Vector Product of Two Vectors, Examples
Unit-2	Differential Calculus: Introduction, differential (dy/dx) as Rate Measurer, Maxima and Minima, Integral Calculus, Significant Digits in Calculations Errors in numerical calculations: Introduction, Mathematical preliminaries, Errors and their computations, A general error formula, Error in series approximation Examples

Reference books:

1. Concepts of Physics part 1 by H.C.Verma (second reprint edition 2020)
2. Introductory Methods of Numerical Analysis :S.S.Sastry (Fifth edition PHI-2012)
3. Physics by Halliday, Resnick and Krane volume 1 (Fifth edition)

B.Sc. Semester-I
Practical: PH-MDC-1 (P)

Sr. No.	Experiment
1	Determine volume of the given slab using calipers
2	Determine volume of the small sphere using micrometer screw gauge
3	Determine radius of curvature using spherometer
4	Determine density of the given sphere using micrometer screw gauge & weighting balance
5	Determine area of cross-section of hollow cylinder using Vernier calipers
6	Calculating area of irregular shaped surfaces.
7	Vector addition practical : find the weight of given body using parallelogram law
8	Estimation of error in measurements.
9	Significant digits and rounding off of numbers.
10	Project work

ReferenceBooks

1. D.C.Tayal, University Practical physics, Edited by IlaAgarwal,Himalayan Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. GeetaSanon, BSc Practical Physics, 1st Ed. (2007), R. Chand & Co.

B.Sc. Semester-I
Course code: PH-MDC-2
Total Credits: 04 (Theory: 2, Practical; 2)
Total Hrs: Theory: 30, Practical: 60
Course Title: Space Science-1

PH-MDC-2 (Theory)

Unit 1	Universe, Comets, Meteors, Asteroids
	Planets - interior planets - exterior planets - crust, mantle and core of the earth - different – region of earth's atmosphere-rotation of the earth - magnetosphere- Van Allen belts -Aurora. Composition and structure of comets –periodic comets–salient features of asteroids, meteors and its use
Unit 2	The Sun
	Structure of photosphere, chromospheres, corona , sunspots , solar flares ,solar prominences – solar piages-satellites of planets -structure, phase and their features of moon.

Reference Books:

1. K.D.Abyankar,Astrophysics ofthesolar system,Universitypress,India (1999)
2. BaidyanathBasu,SudhindraNath BiswasAndTanukaChattopadhyay,
AnIntroductionToAstrophysics,PrenticeHall OfIndia, New
Delhi(2010)
3. Prof.P.Devadas,ThefascinatingAstronomy,DevadasTelescopies,Chennai
4. R.P.Singhal,ElementsofSpacePhysics,PHI,(2009)

B.Sc. Semester-I
Practical: PH-MDC-2 (P)

S.No.	Experiment
1	I-V Characteristics of solar cell and verification of inverse square law of intensity.
2	Study of Plane diffraction Grating.
3	Determination of focal length of convex and plano-convex lenses by auto collimation method.
4	Calibration of spectrometer.
5	Measurement and identification of spectral lines (Hg and Na source)
6	Intensity distribution curve of ordinary electric bulb using photo cell.
7	Study of solar spectrum
8	Sunspots activity analysis.
9	Measurement of Planck's constant using LED.
10	Measurement of wavelength of given LASER source using diffraction grating.

B.Sc. Semester-I
Course code: PH-MDC-3

Total Credits: 04 (Theory: 2, Practical; 2)

Total Hrs: Theory: 30, Practical: 60

Course Title: Fundamentals of EM Radiation

PH-MDC-2 (Theory)

Unit: I	EM Radiation: Introduction to EM Radiation, Model of EM Radiation (Wave Mechanical & Quantum), Characteristics of EM Radiation, Wave nature of EM Radiation. Interference, Diffraction, Transmission, Refraction, Reflection, Scattering, Polarization, Interaction of EM Radiation with matter. Absorption, Emission, Scattering
Unit: II	Types of EM Radiation, The Electromagnetic Spectrum, Types of EM Radiation – Cosmic, Gamma, X Ray, UV, Visible, Infrared, Microwave, Physical properties of EM Radiation, Absorption properties of EM Radiation, General application & Uses of EM Radiation., Biological application & uses of EM Radiation, Basic aspects of Warming radiation, visible radiation & photochemical radiation.

Reference books:

- 1. Biophysics by Casey, East West agency.**
- 2. Waves & Optics: Volume 1 & 2 By Jha, S. R., Gupta & Sanjay; IGNOU**
- 3. Molecular Spectroscopic Method- 1 by IGNOU**

B.Sc. Semester-I
Practical: PH-MDC-3 (P)

1 Study of wave nature of EM radiation in the nature
2. To study the dispersion of polychromatic light through a prism.
3. Measurement of the angle of prism.
4. Measurement of the angle of minimum deviation for different color of light.
5. Measurement of the refractive index for different color of light.
6. Determination of wavelength of light
7. Determination of wavelength of sodium light using Newton's rings.
8. Measurement of the angle of Diffraction using grating.
9. Determination of the wavelength of sodium light using grating.
10. Determination of the wavelength of mercury light using grating.
11. Determination of wavelength of laser light using diffraction pattern of a wire.
12. To determine the resolving power of Prism.

Reference books:

- ❖ Waves & Optics: Laboratory by IGNOU.

B.Sc. Semester-II
Course code: PH-MDC-1

Total Credits: 04 (Theory: 2, Practical; 2)

Total Hrs: Theory: 30, Practical: 60

Course Title: Motion and Force

PH-MDC-2 (Theory)

Unit 1	Rest and Motion: Kinematics, Rest and Motion, Average Speed and Instantaneous Speed, Average Velocity and Instantaneous Velocity, Average Acceleration and Instantaneous Acceleration, Motion in a Plane, Projectile Motion, Examples
Unit 2	The Forces: Introduction, Gravitational Force, Electromagnetic (EM) Force, Nuclear Forces, Weak Forces, Scope of Classical Physics Newton's Laws of Motion: First Law of Motion, Second Law of Motion, Working with Newton's First and Second Law, Newton's Third Law of Motion, Pseudo Forces 5.6 The Horse and the Cart 5.7 Inertia ,Examples

Reference books:

1. Concepts of Physics part 1 by H.C.Verma (second reprint addition 2020)
2. Physics by Halliday, Resnick and Krane volume 1 (Fifth addition)

B. Sc. Sem.II
Practical FOR Physics Multidisciplinary (PH-MDC-1)

Yet to be prepared!

Skill Enhancement Courses: PH-SEC

B.Sc. Semester-I

Course code: PH-SEC-1

Total Credits: 02 (Theory: 1, Practical; 1)

Total Hrs: Theory: 15, Practical: 30

Course Title: Electrical Circuits and Network Skills

PH-SEC-1

Electrical Circuits and Network Skills (Theory)

Unit-1	Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC, Electricity. Familiarization with multimeter, voltmeter and ammeter. DC Power sources: AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers.
Unit-2	Main electric circuit elements and their combination: Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money, Reading of circuit schematics.: Tracking the connections of elements and identifying current flow and voltage drop.

Recommended Books:

1. A textbook in Electrical Technology - B L Theraja - S Chand & Co.
2. A textbook of Electrical Technology - A K Theraja
3. Performance and design of AC machines - M G Say ELBS Edn.

PH-SEC-1

Electrical Circuits and Network Skills (Practical)

Sr.No.	Experiment
1	Identify different electrical components: Resistor, Capacitor, variable resistor, Rheostat, dc voltage sources: battery, battery eliminator, power supply.
2	Use ammeter and voltmeter in a circuit and measure current and voltage
3	Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and Checking electrical continuity.
4	Connect resistances in series and parallel and measure the equivalent resistance using multimeter
5	Build a dc circuit using elements like battery, resistances and switch and measure current flow and voltage drop across the components.
6	Identify the electronic components like rectifying diodes, Zener diodes, transistor, carbon resistance, capacitors, and test them with multimeter

Recommended Books:

1. A textbook in Electrical Technology - B L Theraja - S Chand & Co.
2. A textbook of Electrical Technology - A K Theraja
3. Performance and design of AC machines - M G Say ELBS Edn.

B.Sc. Semester-I
Course code: PH-SEC-2
Total Credits: 02 (Theory: 1, Practical; 1)
Total Hrs: Theory: 15, Practical: 30
Course Title: Printed Circuit Design and Techniques

Printed Circuit Design and Techniques (Theory)

Unit-1 Theory	Layout, Types of Board, PCB Size, Layout approaches Documentation, Mechanical Drawing, Check list for Layout design, Design of PCB Layout: Resistance, Capacitor, Inductor & Conductors, Realizing Supply and Ground, Configuration of Analog and Digital circuit, Express PCB design Design Layout for a rectifier, filter and voltage regulator circuits
--------------------------	--

Printed Circuit Design and Techniques (Practical)

Projects	Design layout on PCB, built and test at least five circuits such as Power Supply with fixed output, Transistor amplifier etc.
-----------------	--

Reference Books:

1. Printed Circuit Board : Walter C. Bosshart
2. A Monogram on Electronic Design : Dr. N.C.Goyal & R.K.Khetan

B.Sc. Semester-I
Course code: PH-SEC-3
Total Credits: 02 (Theory: 1, Practical; 1)
Total Hrs: Theory: 15, Practical: 30
Course Title: Programming in “C” Language

PH-SEC-3

Programming in “C” Language (Theory)

Unit-1	Input unit - output unit - Central Processing Unit (CPU) - programming languages - algorithms - flow charts - operating system - basic principle Basic structure of C - programs - constants - variables - data type - declaration of variables - defining symbolic constants, operators and expression - reading a character - writing a character - formatted input and output statements
Unit-2	Control statements - simple if, if - else, else - if ladder - switching statements - go to statement -break and continue looping - while-do for statements - arrays - user defined functions - string functions - streat, strcpy, strlen, strcmp - elementary idea.

Programming in “C” Language (Practical)

Experiments:

1	Development of algorithm, flow chart and program for the following
2	Average of a set of numbers
3	Area of a triangle
4	Sorting a set of numbers in ascending and descending order
5	Summing the series of numbers
6	Solving the series of numbers.

Reference books:

1. Programming in ANSI C by E. Balagurusamy, McGraw Hill Education (2012)
2. Programming with C by Byron Gottfried, Jitender Chhabra, Schaum Series (2010)
3. The Spirit of C by Henry Mullish (Author), Herbert L. Cooper (Author), (1998)
4. C for all by S. Thamarai Selvi and R. Murugesan, Pearson education (2012)
